624.1305
AER

The Air Line Pilot

March, 1955

Slopeline vs. Centerline
--- Page 2

Congress and Local Service
--- Page 5

THE LIBRARY OF THE
MAR 9 1955
UNIVERSITY OF ILLINOIS

Evaluating the 1049G
—Page 7—

The "Slopelines" on Trial

This is a story that wrote itself. Because of the slopelines' notoriety for optical tricks it's a natural question: Were they to blame?

A Roundup of Press Comment

EDITOR'S NOTE: Did the confusing slopeline lights at Idlewild cause the 26-fatality crackup of an Italian DC-6B air liner there on December 18?

A sampling of press coverage indicates that there is a lot of conjecture that it may have at least been a strongly contributing factor.

TIME magazine, in an article entitled, "The Hated Slopeline", devoted almost a page to it. The New York World Telegram asked: "Did Lights Lure 26 to Crash?" and noted: "Idlewild Lights Out of Date Two Years Ago." The San Francisco Examiner took a look at its own city airport and reported: "Planes Use Centerline to Land Safely Here." These articles, typical of many similar ones, are reprinted here because of the more-than-average interest they will hold for pilots.

* * *

TIME MAGAZINE

"The Hated Slopeline"

"On a rainy afternoon last week, an Italian airliner approached New York City's International (Idlewild) Airport through a low overcast from which heavy rain was falling. Guided by instruments and radar, Captain Gugielmo Algarotti brought the airplane out of ragged clouds at 300 ft. altitude and tried to land on Runway 22. He missed it and circled back into the clouds.

"Captain Algarotti circled for three-quarters of an hour, then was given permission to land on Runway 4. His first try was unsuccessful; so were the second and third. On his fourth approach, the control tower warned him that he was flying too low while still out over Jamaica Bay. He tried to pull up, but the airliner faltered (probably stalled) and plunged into one of the 2,000-ft. piers that carry the 'slopeline' approach lights of Runway 4. Sixteen of the 22 passengers and all ten crew members were killed.

"Authorities are still investigating the cause of the accident. One possibility is crew fatigue. The airliner was flown from Rome (18 hours) without change of crew. But the crash stirred up among pilots a resentment that has rankled for years. Many of them blamed the slopeline approach lights. In the official instructions distributed to its pilots by American Airlines appears the following entry for Idlewild Airport: 'Caution! Slopeline approach lights in operation on Runway 4 can be mistaken for runway.' The same warning is given about the slopeline lights at Washington and Los Angeles. No matter what is decided about last week's crash, many pilots will believe that the Italian captain tried to land on the water between the piers.

"Dashes and Jags. The slopeline consists of two lines of lights at the end of the runway, on sloping supports like saw teeth. When an airplane makes a correct approach, they blend into two continuous lines. If the approach is not correct, they look broken up into dashes or jags, telling the pilot what is wrong.

"The slopeline system, good theoretically, has never won acceptance. Pilots say that when an airliner is descending through low-lying clouds, the lights that are meant to help them sometimes turn into enemies. The critical moment comes when the pilot, who has been staring at his instruments and listening to radio voices, catches a glimpse of the fog-shrouded earth and transfers to visual flying. Often he has only five seconds to shift his attention, size up the situation and make his decision.

"This is not enough time, say the pilots, for figuring out the dashes or jags of the slopeline system. Sometimes a pilot can see only one line of lights and he does not know which one. At the crowded instant of transfer, the angled lights play tricks with perspective. Pilots landing safely but in a trembling sweat have reported that they saw the lights as a ladder plunging toward the earth.

"More dangerous is a thick-weather possibility: when the pilot mistakes the slopeline lights for the lights outlining the runway. Many pilots have had this illusion and have pulled up just before landing on water or broken ground. The Italian captain may have made this mistake and actually landed on the pier that carries the lights.

Vol. 24, No. 3

The Air Line Pilot

March, 1955

Entered as Second Class Matter at the Post Office at Chicago, Ill. Copyright; 1955, by Air Line Pilots Association, International.

Clarence N. Sayen
President

Charles E. Beatley
First Vice-President

Kay McMurray
Executive Vice-President

F. A. Spencer
Secretary

D. J. Smith
Treasurer

REGIONAL VICE PRESIDENTS

W. M. Masland ..... Region I
J. P. Talton ..... Region II
M. E. Swanson ..... Region III
D. S. Spain ..... Region IV
C. A. Peternell ..... Region V

Larry Cates
Legislative Representative

Published Monthly by the Air Line Pilots Association, International, Affiliated with A. F. of L. Publication offices: 55th Street and Cicero Avenue, Chicago 38, Illinois.

Advertising appearing in this magazine cannot be construed as being an endorsement by the Air Line Pilots Association or the Air Line Pilots.

Annual Subscription, $2.50

Ed Modes, Editor

"Ever since the first slopeline system was installed in 1949, both airline managements and the Air Line Pilots Association have protested against it. Their basic objection is that any system with two lines of lights can look like an outlined runway in difficult weather. They prefer a single 'centerline' of lights leading to the center of the runway.

"Balls of Fire. The best system of all, according to many pilots, is the one at Newark Airport. Instead of two lines of lights, it has a single centerline of horizontal bars, which cannot possibly be mistaken for the runway. In thick weather stroboscopic lights ('balls of fire') flash briefly in sequence so that they look to the pilot like a stream of tracer bullets.

"The CAA recognizes the failings of the slopeline system, and the centerline system is now its standard for civil airports. But, presumably because of lack of money, only eight U. S. airports have centerline lights. Only Newark has the balls of fire. A hopeful rumor at International Airport is that the slopeline lights of Runway 4 (now out of commission) will be replaced by the centerline system, perhaps including the balls of fire."

* * *

NEW YORK WORLD-TELEGRAM

"Did Lights Lure 26 to Crash?"

By William Percival

"Did an inferior lighting system at Idlewild—the world's busiest international airport—cause the death of 26 persons Dec. 18 when an Italian DC-6B airliner crashed on its approach?

"Technical experts on the government board investigating the crash say they may never know.

"But if you ask the veteran pilots who fly into Idlewild day and night and in all types of weather, they'll tell you either: 'Yes,' or 'probably.'

"Three things are certain, however:

" 'Slopeline' approach lighting on Runway 4—the fatal runway—does not conform to national and international standards. In other words, it is obsolete.

"Less than 24 hours after the crash, New York's Port Authority promised the Air Line Pilots Assn. it would provide a pier for the newer type of approach lights.

"Air line pilots consider the present lights dangerous, to put it mildly.

Prefer Newark System

"The World-Telegram and Sun, in a poll of senior pilots who fly into both Idlewild and Newark Municipal airports, found them condemning Idlewild's system and praising the 'centerline' system in use at Newark.

"Typical pilot's comments on Idlewild's slopeline system ranged from: 'It stinks,' or 'definitely dangerous,' to 'not adequate.'

"This newspaper asked pilots who are experts on airport lighting to give an opinion on the slopeline-centerline controversy.

"Chief Pilot J. F. Gill of Eastern Airlines made many of the experimental flights used in developing both systems. He has this to say about slopeline lighting at Idlewild.

1. 'They never should have been installed in the first place.
2. 'They create an optical illusion that is deceptive and confusing.

" 'A typical illusion is to believe you are too high and flying nose down. Another illusion is that if you are on the glide path the runway appears to be tilting up.

" 'In rain and poor visibility—even with the red filters now installed—it is possible for a pilot to believe he is over the runway and land short.'

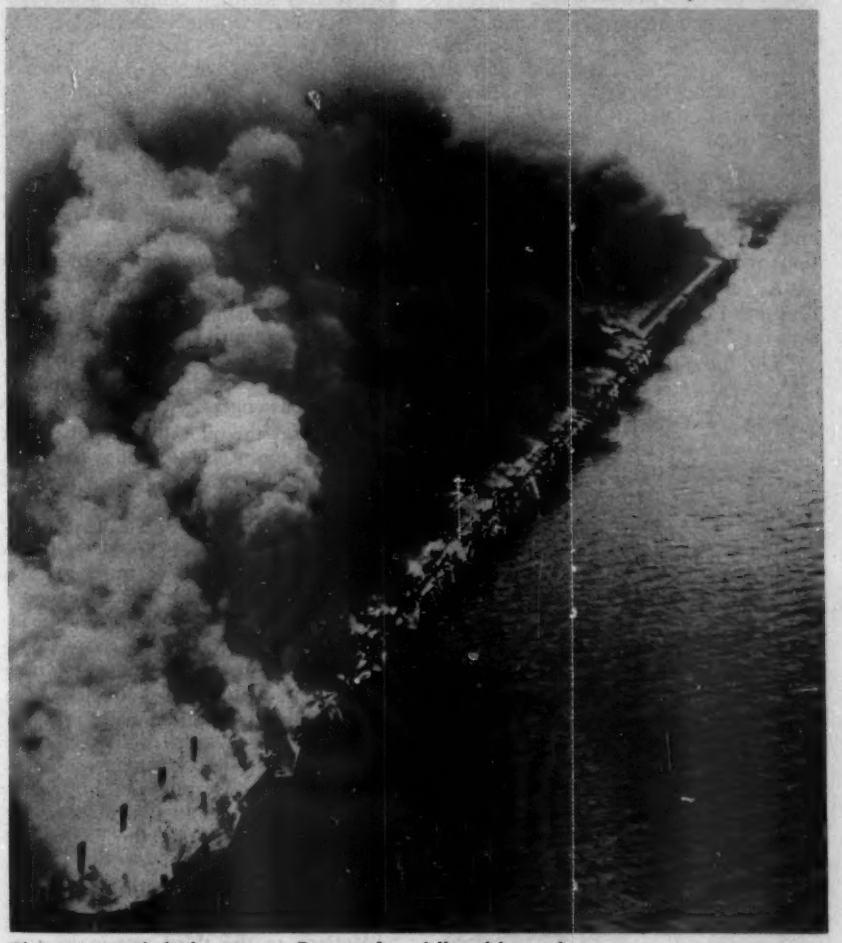
Opposed Since '49

"J. D. Smith, a captain for Capitol Airlines and regional safety officer for the Air Lines Pilots Assn., which represents the bulk of air line pilots, said:

" 'We have opposed slopeline lighting from its inception in 1949. We don't want any part of it because, quite frankly, we think it is dangerous.'

"Capt. Smith said slopeline lighting is dangerous because the two converging lines of lights make it difficult to fly a centerline and because the lights create an artificial perspective which gives the pilot false information.

"He also said: 'It is interesting to note that a week after slopeline lighting was installed at Los Angeles a military pilot landed in the water between the lights.



The approach light piers aflame after Idlewild crash . . .

" 'Another pilot,' he said, 'did the same thing at Washington National Airport, and I can name a half dozen other pilots who had close calls but pulled up in time.'

Centerline Lighting

"Capt. Smith placed responsibility for up-to-date lighting on the Civil Aeronautics Administration. 'The site for the lights at Idlewild is the responsibility of the Port Authority,' he said, 'but a proper lighting system is the responsibility of the CAA.'

"The Port Authority, he added, committed itself to build a pier for centerline lighting within 24 hours after the crash Dec. 18, but the ALPA has no commitment from the CAA.

"A spokesman for the CAA agreed that the United Nations' aviation organization had chosen centerline lighting, both nationally and internationally, and added that any new CAA installations will be centerline lighting.

"As for Idlewild, he said 'The CAA proposes to move toward replacing the slopeline system.'

"The question is: When?"

* * *

SAN FRANCISCO EXAMINER

"Planes Use 'Centerline' to Land Safely Here"

By Bill O'Brien

"One rainy night, two weeks ago, a weary airline pilot placed his plane in a glide and rode the 'centerline' to safety on the runway of San Francisco's International Airport.

"He had gambled his life and those of his passengers on the centerline approach system, but it wasn't much of a gamble, airport officials said, because every 6.6 minutes of every night, a pilot repeats the same performance. And there has not been a crash yet.

"The centerline is merely a row of brilliant white lights extending 3,000 feet into San Francisco Bay from the airport's main runway. The lights are mounted on brightly painted wooden trestles at 200 foot intervals.

Does Good Job

"The centerline became news this week because it has been doing its job quietly and well and a different system of approach lights was blamed for a disaster at New York City's Idlewild Airport.

"In New York, authorities said the crash of an Italian airliner which took thirty-two lives may have been caused by the airport's slope approach system. The slope approach employs twice as many lights as the centerline, but pilots have long condemned it as being doubly dangerous.

"The theory of centerline, according to Emmett Smith, assistant superintendent of airport operations here, is to have a well marked extension of the runway's painted center strip during darkness and foggy weather. 'It's vital the plane land on the center of the 200 foot runway because there is little room for movement on each side of the center,' Smith said.

Pilot Guided

"In bad weather, Smith said, the pilot is guided to the centerline by the ILS (Instrument Landing System). ILS sends out an electronic beam which registers in the cockpit. It tells the pilot whether his glide is too steep, too shallow, or whether he is left or right of the runway.

"There is a moment, Smith added, when the pilot abandons instruments and completes the approach by pointing the plane's nose down centerline's string of lights.

"It was during this all important moment, authorities say, when the Italian pilot may have made the decision which brought death to himself and his passengers.

"They say the pilot, flying in the rain, may have misinterpreted slopeline's signals. Slopeline consists of two rows of lights on sloping supports, like saw teeth at the end of the runway. During a correct approach, they blend into two continuous lines. If the approach is incorrect, they look like a series of jagged dashes.

"In bad weather, pilots say, they sometimes see only one line and they don't know which line. At times the angled lights play tricks with perspective, pilots have charged, and on some occasions, they mistake them for lights which outline the runway. The Italian pilot may have made this mistake for he crashed into one of the 2,000 foot piers which carry the slopeline lights.

Pilots Object

"The pilots also have voiced strong objections to the third system in general use—the 'left hand' system. Left hand employs a single row of lights extending from the left edge of the runway. The approach is made by lining up the left plane's wingtip with the lights.

"There is a tendency to veer, pilots say, and there is also a tendency to 'over correct' towards the right when seeking the center of the landing strip. The heartiest indorsement of any system has always been for centerline, which is used by only four airports other than San Francisco's.

"Centerline's brightness can be modified with the weather. It is controlled from the airport's tower and when the fog is thickest, centerline is turned up to its brightest intensity.

"At its flashiest, centerline has been reported glowing brightly by an airliner over Fresno.

Began in '53

"It was first turned on June 20, 1953, after the city had spent $109,000 installing trestles to hold the lights and the Civil Aeronautics Administration had paid $50,000 for the electrical system.

" 'It's cheap life insurance,' Smith said. 'It's economical to maintain and it hasn't failed yet.'

"The airport will have a further landing aid in mid 1955 when the new Ground Control Approach system is readied for operation. GCA differs from ILS in that an operator sits before a radar screen and checks the position of the plane in relation to centerline. By using radio he 'talks' the plane to 'centerline' and the pilot then takes over for a visual landing.

"GCA will not end the usefulness of ILS, Smith said. Both systems will be used in the future as a check against each other.

" 'But when gadgets can't help and we have to use our eyes,' Smith said, 'centerline will still be doing its job.' "

* * *

NEW YORK WORLD-TELEGRAM

"Idlewild Lights Out of Date Two Years Ago"

By Roger Stuart

"Only eight U. S. airports have or soon will have the officially approved centerline approach lighting system, the Civil Aeronautics Administration disclosed today.

"This system, adopted by this country after its approval by an international air conference in Montreal in 1952, is designed to facilitate aircraft landings under restricted visibility conditions.

"Several major airports, including New York's Idlewild, where 26 persons were killed Dec. 18 when an Italian DC-6B airliner crashed on its approach, are continuing to use the outdated 'slopeline' lighting system. Among these are Los Angeles, Washington, D. C., and Indianapolis.

First in Newark

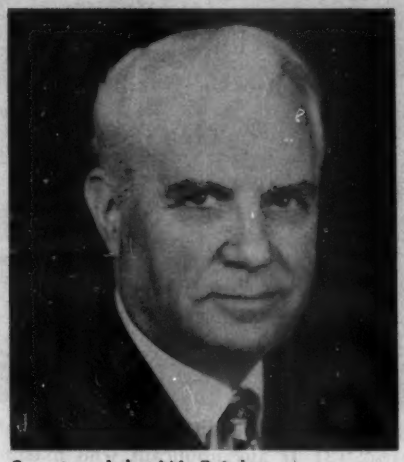
"Newark, the first U. S. airport to install the approved centerline system, used it even before the Montreal conference.

"The remaining airports where the

(Continued on Page 12)

Congress and Local Service

Senator A. S. Monroney . . .



Senator John W. Bricker . . .

Senator Warren G. Magnuson . . .

Interest in Local Service is rekindled by new Bills in the 84th Congress.

By Ed Modes
Editor, The Air Line Pilot

Nineteen fifty five could well be the year in which the destiny of Local Service is chartered and determined.

The future of this vital part of the aviation industry, providing otherwise unavailable air transport to millions in time of peace and an irreplaceable National Defense asset in time of crisis is now up to Congress.

Congress holds the key to this problem because it has the power to withhold or grant permanent certification so vital to the stability and growth of these air lines.

Seen As Necessity

Many observers among those who have made a study of Local Service are convinced that permanent certification is the difference between Local Service taking its place as a virile, growing part of the aviation economy or playing the "poor cousin" of the family, struggling along under penalizing conditions as an experiment, which it no longer is.

Permanent certification, it is pointed out, means incentive and economic stability that temporary certificates fail to provide.

Congressional interest in this number one problem of the Local Service carriers began in the 83rd Congress and has reappeared early in the first session of the 84th Congress.

Three Bills Introduced

So far this year, three bills, one in the Senate and two in the House, have been introduced by aviation-minded lawmakers. They are S. 651 in the Senate, introduced by Senator Magnuson, and H.R. 2225 and H.R. 526 introduced respectively by Representatives Williams and Hinshaw in the House. Bill S. 2647, introduced last year as the late Senator McCarran's Omnibus Aviation bill, has also been revised and introduced in this session by Senator Bricker as S. 308. This, too, contains provision for Local Service permanent certification.

Bill S. 651

Bill S. 651, introduced January 21, 1955, provides:

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

"That section 401 (e) (2) of the Act of June 23, 1938, as amended (49 U. S. C. 487 (e) (2); 52 Stat. 987), is amended by adding the following:

" '(3) If any applicant who makes application for a certificate within one hundred and twenty days after the

Representative Carl Hinshaw . . .

Representative John B. Williams . . .

enactment of this section shall show that, from the date of enactment of this section until the date of its application, it or its predecessor in interest, was an air carrier furnishing, within the continental limits of the United States, local or feeder service consisting of the carriage of persons, property and mail, under a temporary certificate of public convenience and necessity issued by the Civil Aeronautics Board, continuously operating as such (except as to interruptions of service over which the applicant or its predecessors in interest have no control) the Board, upon proof of such fact only, shall, unless the service rendered by such applicant for such period was inadequate and inefficient, issue a certificate or certificates of unlimited duration, authorizing such applicant to engage in air transportation between the terminal and intermediate points within the continental limits of the United States between which it, or its predecessors, so continuously operated between the date of enactment of this section and the date of its application: *Provided*, That the Board in issuing the certificate is empowered to limit the duration of the certificates as to those intermediate points which have, over a reasonable period of time, generated insufficient traffic and revenues to reimburse the applicant carrier for its direct costs and a reasonable share of its indirect costs incurred in serving such points.' "

Bill H.R. 2225

Bill H.R. 2225, introduced January 13, 1955, provides:

"Be it enacted by the Senate and House of Representatives of the United States in Congress assembled, That section 401 (3) (2) of the Act of June 23, 1938, as amended (49 U.S.C. 487 (e) (2); 52 Stat. 987), is amended by adding the following:

" '(3) If any applicant who makes application for a certificate within one hundred and twenty days after the enactment of this section shall show that, from the date of enactment of this section until the date of its application, it or its predecessor in interest, was an air carrier furnishing, within the continental limits of the United States, local or feeder service consisting of the carriage of persons, property, and mail, under a temporary certificate of public convenience and necessity issued by the Civil Aeronautics Board, continuously operating as such (except as to interruptions of service over which the applicant or its predecessors in interest have no control) the Board, upon proof of such fact only, shall, unless the service rendered by such applicant for such period was inadequate and inefficient, issue a certificate or certificates of unlimited duration, authorizing such applicant to engage in air transportation between the terminal and intermediate points within the continental limits of the United States between which it, or its predecessor, so continuously operated between the date of enactment of this section and the date of its application.' "

Bill H.R. 526

Bill H.R. 526, introduced January 5, 1955, provides:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 401 (3) (2) of the Act of June 23, 1938, as amended (49 U. S. C. 487 (e) (2); 52 Stat. 987), is amended by adding the following:

" '(3) If any applicant who makes application for a certificate within one hundred and twenty days after the enactment of this section shall show that, from the date of enactment of this section until the date of its application, it or its predecessor in interest, was an air carrier furnishing, within the continental limits of the United States, local or feeder service consisting of the carriage of persons, property and mail, under a temporary certificate of public convenience and necessity issued by the Civil Aeronautics Board, continuously operating as such (except as to interruptions of service over which the applicant or its predecessors in interest have no control) the Board, upon proof of such fact only, shall, unless the service rendered by such applicant for such period was inadequate and inefficient, issue a certificate or certificates of unlimited duration, authorizing such applicant to engage in air transportation between the terminal and intermediate points within the continental limits of the United States between which it, or its predecessor, so continuously operated between the date of enactment of this section and the date of its application.' "

Although the wording of the various bills differ slightly, the intent and purpose of all are the same—to amend the applicable section of the Civil Aeronautics Act to provide permanent operating certificates for the Local Service air lines.

The Sponsors

Who are the men who have recognized this problem of the Local Service carriers and introduced legislation aimed at solving it?

They're both Democrats and Republicans and they represent widely scattered sections of the country. They have all evidenced one great thing in common—an awareness of the tremendous importance of U. S. air progress in order to maintain our world leadership in an air age.

Senator Warren G. Magnuson (D-Washington), who introduced S. 651, is Chairman of the Senate Interstate and Foreign Commerce Committee.

Representative John Bell Williams, (D-Mississippi), who authored H.R. 2225, is a member of the House Interstate and Foreign Commerce Committee and has a close familiarity with aviation as a war time pilot.

Representative Carl Hinshaw (R-California), who introduced H.R. 526, is a veteran member of the House Interstate and Foreign Commerce Committee and has long been noted for his interest in aviation affairs.

Senator John W. Bricker (R-Ohio), who introduced S. 308, is a member of the Senate Interstate and Foreign Commerce, and Banking and Currency Committees. He is also a member of the Joint Defense Production and Atomic Energy Committee. He was formerly governor of Ohio and the 1944 Republican Vice Presidential candidate.

New Chairman

Another person who will be close to this legislation is the new chairman of the sub-committee on Aviation, Senate Commerce Committee, Senator A. S. Monroney (D-Oklahoma). All commercial aviation matters will pass through this sub-committee during this Congress. Senator Monroney is a former reporter and political editor, a Phi Betta Kappa and a winner of the Collier award for Distinguished Congressional Service. He supported the permanent certificate legislation last year.

In Public Interest

These are the men who have taken the lead and the first steps toward giving Local Service air transportation the final impetus it requires to prosper and the recognition it has earned in growing from the fledgling feeder line industry of yesterday to the promising Local Service network of today—so far with little, if any, assistance.

In granting permanent certificates to these carriers now Congress will have an opportunity to render a great service to thousands of small towns, millions of air travelers, the U. S. air transport leadership, and the National Defense interests.

Lockheed and ALPA representatives confer during pilot inspection of L-1049G at Lockheed factory.

Evaluating the L-1049G

By T. G. Linnert
Head, ALPA Engineering Dept.

At the first glance the relationship between air line pilots and the aircraft manufacturing industry would seem a casual one.

It would probably be summed up by the man on the street as: "One builds 'em and one flies 'em."

That's the obvious—something like a match-up-the-blocks test, proving that they're related in some elementary sort of way.

Beyond that, less obvious but far more important is that the pilot has been very practically logically defined as the ultimate consumer of the aircraft industry.

This was most recently pointed up by a neutral in a much-publicized case involving operational factors when he stated:

"To a degree unique in American history, the pilot and his organization have participated in planning and in making important decisions in the air line industry along with the managements of the air lines. They have been consulted on new equipment and its functioning, on airport facilities, fire control, safety, engineering and many other matters which elsewhere would be considered to be primarily within the province of management.

"This consultation has by no means been perfunctory. Plans and programs which would involve changes in basic working conditions have been held up until approved by the pilot group. This course has been followed in matters as vital as airworthiness of a certain model of airplane which the pilots thought it wise to ground. In one instance, a type of aircraft was grounded until certain agreed upon changes were made. The pilots' association has been called upon to join with ATA, the carriers' association, in combatting lawsuits brought by certain municipalities which would interfere with operations at various airports."

Probably the most recent example of this ALPA-industry relationship can be found in the ALPA evaluation of the new Lockheed model 1049G, December 14, 15 and 16.

Evaluating a plane actually falls into three phases:

▶ Phase One — Airplane Inspection, which takes in how it's built, the methods used, a good look at components, a study of specifications and analysis.

▶ Phase Two—Flight Test Demonstration of a plane's performance and ability to meet operational requirements.

▶ Phase Three—Service Testing, the real and final test that determines the ability of any new airplane to conduct an acceptable level of safety and economical air line flying.

This report covers Phase One in the evaluation of the L-1049G. The objective: exploration of the make-up of the airplane from the "line" pilot point of view, bearing in mind his requirements for doing his job consistently with safety.

Some pertinent observations about the plane will undoubtedly prove of specific interest to pilots of Northwest and Trans World Airlines and of more general interest to most other pilots.

The Phase One Evaluation fell into 8 categories: (1) Tour of factory; (2) Electronics; (3) Landing gear and hydraulics; (4) Power plant; (5) Fuel system; (6) Emergency equipment; (7) General; and (8) recommendations.

The Factory Tour

As was expected, modern methods of fabrication and sub-assembly of parts is used. Take wing construction, for instance. The lower skin blanket of the

(Continued on Page 10)

Airplane evaluation falls into three phases—inspection, flight test, service test. ALPA's engineer here reports on Phase I in evaluating the L-1049G.

MEC's

The American Airlines MEC meet at the Home Office. Prominent in order of business: report on settlement of 8-hr. dispute on AA and current negotiations featuring joint retirement and working conditions studies.

Dues

ALPA Treasurer D. J. Smith Signs $100,000 check, representing prepaid dues, to firm handling ALPA's investment.

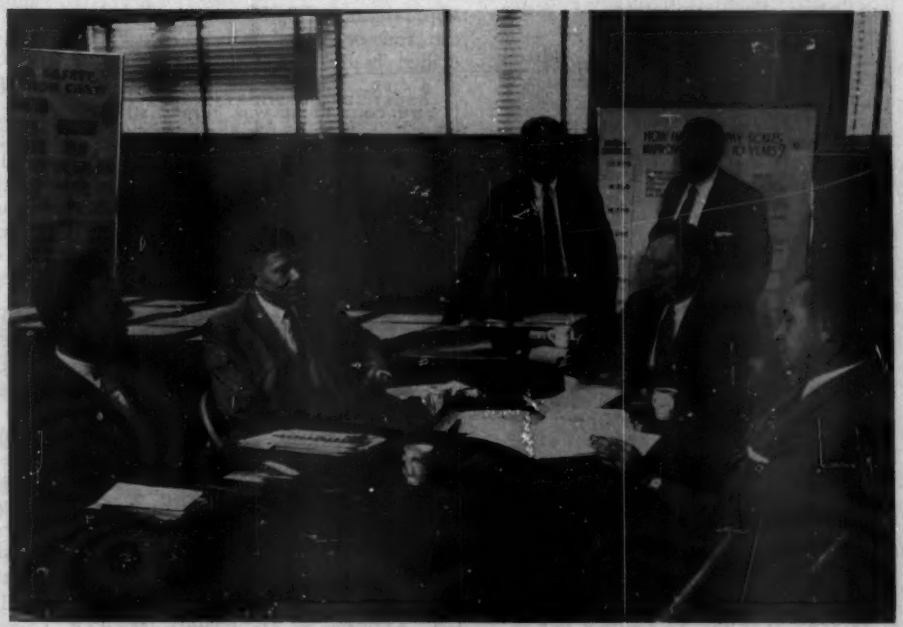
Insurance

The reactivated ALPA Insur[illegible]nd Mutual Aid Committee in se[illegible]b. 7 to study loss-of-license pr[illegible]

The ALPA CAMERA

Jets

President Sayen (above) and Executive V. P. McMurray (left) pictured during Senior Officers' Jet Instrument Familiarization course at Moody Air Force Base.



Negotiations

The UAL Negotiating Committee meets at Home Office to discuss Agreement. Agreement is now in mediation.

(Continued from Page 7)

center section, from outer panel to outer panel, is machined out of three solid pieces of aluminum alloy material. This advanced method of fabricating the lower wing skin blanket is said to provide a stronger structure and smoother surface, save weight, and eliminate many pieces such as sections of skins and stringers.

Good workmanship was evidenced in smooth appearances of wing, empenage and fuselage. The Constellation series and its tooling was in development for approximately 12 years. As a result, tooling "bugs" have been eliminated and workers' skill advanced to a high level.

Lockheed maintains extensive laboratory and testing facilities for development work. They test their own and other manufacturers' components, from the smallest electrical item to the largest structural items to their own satisfaction. Among other things, Lockheed has electrical thermal deicing, plastic foam, and "sandwich" airframe component and other advanced projects in research.

Electronics

From an electronics standpoint, some improvements are noticeable.

What about radar? was a natural question. TWA has three sets ordered for immediate installation. NWA has none ordered at this time, but there are plans for installation of radar equipment at a later date.

The committee questioned Lockheed as to the advantages of one type of airborne radar over another (RCA or Bendix). Lockheed's contention is that the main thing to do is for the carrier to make up their mind and get them installed. They claim that either make provides approximately 95% coverage of the same information.

All 1049G models will have flap phasing indicators with an automatic shut-off feature if unsymmetrical flap extension or retraction should occur. Four 350-375 amperage generators of improved design are installed on the 1049G.

Landing Gear and Hydraulics

A full eleven seconds has been chopped from landing gear retraction time, which now takes 10 seconds compared to 21 seconds on the 1049. The nose gear has a screwjack (Saginaw type) arrangement for cranking it down from the cockpit—a feature, incidentally, that can be applied optionally to the entire 1049 series. The nose gear retracting mechanism has the new Saginaw ball bearing feature for extension and retraction.

The 1049G brake system is similar to the L049 system. However, an anti-skid wheel brake installation is being evaluated on a Navy Lockheed by the Navy at Patuxant, Maryland.

The landing gear and wing structure is stressed for 150,000 maximum gross weight, the maximum landing weight being 113,000 lbs.

An auxiliary hydraulic pump to take the place of the hand pump is an optional piece of equipment. By virtue of a 2-way hydraulic crossover valve, it is now possible to utilize primary hydraulic system pressure to operate units controlled by secondary system. Hydraulic Quantity Gauge indicates primary system only but when gauge shows full, both primary and secondary systems are full. This is due to the baffle in the single reservoir separating the two systems supply.

Power Plant

One very visible improvement in the power plant is the increased use of stainless steel in the engine nacelles and the use of stainless steel fire walls.

Closer scrutiny of the power plant brings out many other interesting facts.

The oil tank is now in an improved location aft of the firewall instead of in front of it as in the 1049.

The turbine wheel of the Wright Compound Engine is fused. This is accomplished by drilling small holes in a few blades at the base to fail at approximately 30,000 rpm, well below the turbine wheel failure rpm. The drilled blades fail first and thus act as a fuse.

Fire equipment was closely studied. The fire extinguishing agent is either "Dibromo," a liquid, or "Bromo-tri," a gas, both of which are claimed to be less toxic than CO^2. Fire extinguishing provisions have been added for Zone No. 1 as well as 2 and 3. An engine which has had the extinguishing agent shot into it can be restarted. Inside the fuselage, there is no extinguishing agent except portable hand extinguishers and no fire control lines cross through the fuselage. Baggage compartments are pressure sealed and fire-controlled exclusively by oxygen starvation. The compartment may be visually investigated through upper hatch by a wide angle lens, but not opened.

Specific fuel consumption is lower on the Wright 3350 engine with turbine units. Compared with the 1049, specific fuel consumption is reduced from .42 to .38 with an additional 200 HP and an additional 450 HP for takeoff.

There is a direct ram air scoop with shut-off door and alternate air supply source under cowl. The shut off door automatically opens the alternate supply door. There is no change in the heater door operation.

Fuel System

Improved accuracy and reliability of fuel gauges can be expected with the Capacitance type fuel gauges now utilized on the 1049G model. Dip sticks for fuel measuring can be used with accuracy down to 50 gallons in every tank.

Some brief notes on the tip tanks: (1) because of wing structural limits their capacity is 600 gallons maximum. (2) They're equipped with dump valves. (3) The tanks do not decrease the plane's speed. They do of course, induce inertia loads on the wings during operation on rough runways and airport taxi strips.

It was pointed out that NWA was getting tip tanks on all four of its planes inasmuch as their long range operation will require them in addition to center section tanks.

Emergency Equipment

For emergency use, the 1049G has the following equipment:

Dry battery ditching lamps at each emergency exit, so arranged to light up the outside area to some extent. TWA has four dry batteries supplying the system with no impact switch operation but manual switches, operated by stewardess or engineer at cockpit and hostess stations, before landing and take off during the hours of darkness.

Life rafts are stored externally in wings. Ejection is controlled by pulling out the cabin emergency exit over wings, both left and right, and pulling life raft release control. Rafts are tethered to the plan by a static line stressed

The 1049G Pilot Evaluation Team

ALPA representatives were: TWA: E. Boyce (Chairman), P. Bracken, B. Hewitt, R. Adickes, and J. Frier; NWA: M. Cooney, R. Bird, and W. Barnard. Home Office: T. G. Linnert.

Lockheed personnel taking part were: R. Thoren, J. Duffenbach, V. S. Upton, M. K. Judd, J. B. Pitkin, E. R. Schuberth, R. R. Richolt, C. A. Tolivar, E. H. Collart, H. F. Rempt, B. L. Messinger, J. F. McBrearty, J. P. Stockdale, and G. D. Moonan.

to fail without damage to the rafts in case the airplane is sinking rapidly. CO^2 is released when raft is ejected. Installation is designed to insure against unwanted ejection.

Escape ropes are installed in the frames of the emergency exits.

General

Some final general observations:

New type deicer boot has chordwise inflating cells that are claimed to be more efficient for ice removal.

Fibre glass plate and aluminum foil on inside of fuselage is claimed to provide better soundproofing.

There is a nine "G" seat and floor structure provided throughout.

Two types of anti-collision lights are used. TWA and NWA are installing a Federal light on the top and bottom of fuselage. The Air Force Constellation 1940G used the Grimes light.

Back lighting is used on the flight engineer's instrument panel.

There hasn't been much change in pressurization and air conditioning over the 1049. Maximum pressurization is 5.5 lbs.

A manual pressure release is designed into the flight engineer's door. Cabin window structure has been improved and redesigned for increased reliability.

Recommendations

As a result of the close inspection of the plane, ALPA has submitted a total of 18 recommendations which pilots would like to see incorporated into the plane. Some of these are lengthy and technical; others a matter of ALPA policy. All of them are being studied by interested parties. The objective of the recommendations is, of course, to increase the efficiency and safety of the 1049G Constellation.

Conclusion

The Pilot Evaluation Committee has been given the opportunity to consult with the leading Lockheed Aircraft Company engineers and flight test personnel on the Lockheed 1049G project and is favorably impressed. We say this with the reservation that our three-day visit at the Lockheed factory could not possibly be construed as to mean thoroughly going into all phases of the airplane. Only a period of service testing will determine the real ability of this airplane or any new airplane to conduct an acceptable level of safe and economical air line flying.

The Air Line Pilots Association gratefully acknowledges the efforts of the Lockheed Aircraft Company toward making possible first-hand knowledge of their product to the scheduled air line pilots.

Tomorrow's Air Line Pilot

Gary Wright has his shirt-tail clipped in solo ceremony.

Remember back when *you* soloed? Quite an accomplishment. And rightfully proud of it you were, too.

K. D. Wright, of Delta-Chicago & Southern, came about as near as you can to recapturing that once-in-a-lifetime thrill when his son, Gary, who also has his eyes on an air line piloting career, soloed on his 16th birthday last August 7.

Gary has been interested in flying all his life, says his proud father, who reports that Gary spends his leisure time building models and now has about 25.

Gains Practical Experience

"We bought a Luscombe 8-E about a year ago and Gary has approximately 100 hours now, of which 30 are solo and 35 dual cross-country," Captain Wright said.

"We use the plane for pleasure, also, like fishing trips to Florida.

"The Luscombe is well-equipped. It has a full set of instruments in a custom panel which Gary helped me install. He also helped me install a Narco Super-homer radio, so you see he is gaining a lot of experience working on his own plane."

He's Half Owner

The plane in which Gary soloed is half his. He paid for his part with money earned from a paper route.

Gary Wright is a Junior at Russell High School in East Point, Ga., where he's studying hard on math. His father, K. D. Wright, has been flying for Delta-C&S since June 27, 1944, and has been an active member of ALPA for almost ten years.

Capt. K. D. Wright, Delta-C&S pilot, congratulates his son.

The Slopeline vs. the Centerline

(Continued from Page 4)

new — and many think safer — system reportedly in operation, or soon will be, are at Fort Worth, San Francisco, Denver, Pittsburgh, Boston, Salt Lake City, and Knoxville, Tenn.

"Elsewhere throughout the country, there is great lack of uniformity—one of the goals of the international conference—in approach lighting systems.

" 'There are approximately 60 airports,' a CAA official said, 'with all varieties of approach lights. These include neon lights, which usually have low intensity and therefore are more difficult to see when mist is thick; left-hand row lights, which were considered standard before the slopeline system was adopted; and high-intensity lights.'

"The CAA acknowledged that responsibility for installing the approved centerline system in airports rests with that agency.

" 'But it's expensive, averaging $150,000 per system to install,' declared a spokesman. He added: 'We've included a substantial amount in the budget request for the next fiscal year to get the program moving. This will be placed before Congress in President Eisenhower's annual budget message.'

"No estimate was given as to how long it will take to complete installations at all airports. 'We'll just keep doing a part of the job each year until it's done,' it was explained.

"Though declining to discuss the fatal crash of the DC-6B at Idlewild, on grounds that 'we can't talk about pending investigations,' agency officials willingly discussed what they called the merits of both lighting systems.

Slopeline Disliked

"It was conceded that 'some pilots' don't like the outdated slopeline system, two rows of lights extending 300 yards from the runway and appearing to converge at the far end. This opposition, it was said, often is based on the pilot's reluctance to follow the lights' indication that the plane is either to the left or to the right of the runway, or that its wings are tipping, or that the plane should either gain or lose altitude.

"The World-Telegram and Sun yesterday was told by a number of veteran pilots that the slopeline system's lights create a confusing optical illusion.

"In the centerline system, according to CAA officials, the pilot brings his plane 'astraddle' to the line and follows it down to the center of the runway."

An Editorial Conclusion

A fitting conclusion to this roundup of press reaction was subsequently written by the World-Telegram in an editorial, *"Modernize Idlewild's Lights."*

The editorial stated:

"It may never be determined whether inferior lighting caused the crash of an Italian airliner fatal to 26 persons at Idlewild Airport last month. But the subsequent investigation has shown that Idlewild's approach lighting system is obsolete.

"We think our news article yesterday conclusively spelled out arguments against the method in use at the airport and pointed up the need of a new system.

"Airline pilots consider the present lights dangerous. The new plan—involving a series of lights down the center of the approach lane rather than at each side—has been chosen as the international and national standard. The Civil Aeronautics Authority says that all new lighting installations will use this centerline approach. The Port of New York Authority says it will furnish the foundations if and when the CAA wants to install the new lights.

"Since there is unanimous agreement that centerline lighting is superior, we'd like to see the CAA act promptly to put it in at Idlewild. That field is the world's busiest international airport and its facilities should be nothing less than the most modern and best at all times."

Left: The Slopeline System at Idlewild, the lights with doubts.

Right: The Centerline System at San Francisco, the lights that pilots prefer.

Scouting the Tropical Cyclone

Aerial Reconnaissance of Hurricanes Is Being Increasingly Used for Early Warning.

By R. W. Westover
Lt. Commander, U. S. Navy

During the past one hundred years a great deal of research data has been gathered, and many words have been written, concerning one of nature's most overwhelming phenomena, "The Tropical Cyclone." Employment of aircraft to provide early warning on the location, intensity, and movement of these storms is, however, of very recent origin. The first recorded intentional flight into the center or "eye" of a hurricane occurred in July, 1943. Since that time this method of obtaining accurate fixes and data has been increasingly employed. These flights, together with greatly increased enroute weather reporting by other aircraft and surface craft, have been largely responsible for a tremendous saving of life and property. This very favorable result, and the fact that this type of flying is, to say the least, unusual, has created considerable interest among aviation personnel, and especially among pilots and air crews.

"Hurricane" is the name given a tropical cyclone of a certain degree of intensity when it occurs in the Atlantic Ocean, the Caribbean Sea, the Gulf of Mexico, or the Eastern North Pacific Area off the coast of Mexico. The same type of tropical cyclone would be known as a "Typhoon" in the Western North Pacific and in the Southern Pacific Ocean. In local areas adjacent to the Philippines they are called "Baguios," and in local areas adjacent to Australia, "Willy-willies."

Since tropical cyclones are essentially maritime phenomena, as a rule, aerological data is relatively sparse over large areas traversed by them. Even in the Antilles and along the South Atlantic and Gulf coasts of the United States where radiosonde and pilot balloon stations are located, it has been extremely difficult to obtain upper air observations within the storm areas themselves. Therefore, many of the characteristics and mechanics of the tropical storm are still not definitely known.

In order to clarify the nomenclature of tropical cyclones, they are classified, according to intensity, as follows:

TROPICAL DISTURBANCE — A circulation, slight on the surface, possibly more marked aloft encompassed by one or no closed isobars, and common throughout the tropics.

TROPICAL DEPRESSION—A circulation including one or more closed isobars, with wind force equal to or less than 34 knots. It is frequently observed along the inter-tropical convergence zone and much less frequently in the Trades.

TROPICAL STORM—A circulation containing numerous closed isobars, and with wind force more than 35 knots but less than 64 knots.

HURRICANE—A circulation with wind force 65 (plus) knots.

Tropical cyclones undergo constant metamorphosis from birth to decay. Their general characteristics vary considerably, as regards surface and upper air structure, as the storm progresses from one phase of development to another. Their life history may be divided into four stages:

1. The formative or incipient stage which begins when a tropical disturbance first develops surface circulation, and ends when it reaches hurricane intensity.

2. The stage of immaturity or deepening, during which the cyclone continues to deepen until the lowest central pressure and maximum intensity are reached. The storm is most symmetrical during this period, and only a relatively small area is as yet involved.

3. The stage of maturity, in which there is no further deepening, the area covered by gales and hurricane winds is larger than at any other period, and the intensity is gradually decreasing.

4. The stage of decay, in which the storm is dissipated over land, or is recurving northward and assuming extra-tropical characteristics at higher altitudes.

From the Observer's Eye

In any discussion concerning reconnaissance by aircraft of a tropical cyclonic storm, the reason for its being, and nature of the storm itself, become of interest. However, as in any form of reconnaissance, the reason for the suspected enemy's being (and a cyclone can truly be said to be an enemy) is of secondary importance to its actual presence, its actions, and its future intentions. Therefore, this paper will not dwell to any great extent on the meteorological aspects of these storms, but rather on what the airborne observer sees and feels as approach and penetration is accomplished or attempted.

The process of reconnaissance must be keyed to the knowledge of where the threat will originate. We know that tropical cyclones originate in Easterly Waves, in the Inter-tropical Convergence Zone, and occasionally in the trailing southerly portions of old polar troughs. It appears that tropical cyclones will develop only over comparatively warm water (probably 82° Fahrenheit, or higher). It is apparent that a very special set of circumstances is necessary for their development. As yet, however, there is no generally accepted definition of exactly what synoptic situation is responsible for the formation of a tropical cyclone. It is, therefore, necessary to regard any area where these conditions exist, as a potential reconnaissance area.

Factors Considered

Once a reconnaissance area has been determined, be it an Easterly Wave, the Inter-tropical Convergence Zone, or a Polar Trough, and if airborne reconnaissance is feasible, certain factors must be considered. From the viewpoint of the operator of the reconnaissance aircraft, the first consideration is the geographical position of the area. Reconnaissance over or near land masses, at low altitudes, is obviously ill-advised. Reconnaissance during the hours of darkness must assume different techniques than daylight reconnaissance. Basically, four methods of reconnaissance have been adopted: Low and high level daylight penetration, circumnavigation and radar tracking. Each of these methods has its advantages, and each presents its problem.

Flight conditions in most tropical storms in the disturbance or depression category are considered no more dangerous than flight conditions in ordinary thunderstorms, but a tropical storm or a hurricane becomes another "breed of cat."

Separate Methods

In order to set forth the varied intelligence gained by aerial reconnaissance, it may be politic to investigate each method separately as follows:

Low Level Daylight Penetration
High Level Daylight Penetration
Circumnavigation
Radar Tracking and Observation

Low level penetration, because of its exploratory nature, prohibits definite rules of flight technique, or statements concerning observation. Each storm is an individual, configured differently, and therefore, flight procedures must differ in each case. However, if we assume that the storm is more or less symmetrical, and that it conforms in general to the classical picture of a hurricane, the observer will see, as he approaches the storm the following cloud arrangement: Cirrus, which frequently seems to radiate from a point on the horizon in the general direction of the storm, is first observed. The Cirrus will thicken to cirro-stratus, and then to alto-stratus and alto-cumulus. Soon occasional cumulo-numbus, extending through the upper deck with passing squalls, will appear. Finally, a solid dark wall of cloud appears, and squalls become almost continuous with stratus bases of 500 to 700 feet, or with a precipitation ceiling at the surface. At sea, the clouds are frequently reported down to the water. However, these reports are considered unreliable, since rain and flying spray often reduce visibility to zero. Finally, the center or "eye" is seen with a broken or scattered middle deck and with cirrus and cirro-stratus nearly always present. The sun may be visible, with patches of blue sky showing through the cloud decks, in the "eye."

Kept Below Cloud Level

Before continuing the description of conditions encountered, the matter of low level flying should be discussed. This term implies flight altitudes of 300 to 1800 feet, the aim being to keep the aircraft below the level of the clouds. Since the whole purpose of the flight is to supply storm position and intensity data, it is important that visual contact be maintained with the surface as much as possible consistent with safety. The trained aerologist can then provide the accurate estimates of wind force and direction upon which good navigation and storm reports depend. In addition, certain aerodynamical factors make low level flight desirable. Downdrafts, with accompanying vertical mushing, seem to be reduced and dampened out by the "cushioning effect" of a boundary layer of air near the water's surface. This aids in preventing a "mush" from becoming a "splash." On the other hand, turbulence is greatly increased in the very low levels (100 to 200 feet) by the "eddy effects." The smoothest (a strictly comparative term) ride, as a result, is obtained below the cloud deck level, and above the "eddy effect" level; that is, at from 400 to 700 feet.

Differing Turbulence

Turbulence encountered on a low level flight is, in common with all the other factors, different in each storm. The general turbulence field commences with light clear air turbulence prior to entry into the convective ring of thunderstorms outside the edge of the storm, at which time the normal, moderate, high amplitude—low frequency turbulence associated with thunderstorms is encountered. While transversing the subsidence area inside the convective ring, very little turbulence is encountered. This condition extends to the storm edge. In an average storm, the distance travelled from the outer convective ring to the actual storm edge is approximately seventy miles. Upon entering the actual storm area, turbulence increases, and its characteristics change violently. Due to the flight level, between the downdraft currents and the updraft created by the "eddy effect," turbulence increases in frequency and decreases in amplitude. As a result, the aircraft is in a state of constant agitation. This condition is further aggravated by the horizontal turbulence created by horizontal wind variations. Such variations range from 50 to 75 mph in average currents of 100 mph velocity. Upon entrance into the inner wall of the storm, the turbulence increases and the general condition is one of just hanging on and of doing the best one can. "G" loads on aircraft surfaces become excessive, and due to the rapid reversal of stresses, attempts at correcting changes of altitude or attitude are almost unavailing. It is in this area, and under these conditions, that the "cushion" provided by the boundary layer of air just above the water becomes so important.

Just as every cloud has a silver lining, every hurricane has an "eye." To properly appreciate this, one of the most spectacular aspects of the tropical cyclone, a low level penetration flight must be made. At the conclusion of approximately 80 miles of constant extreme turbulence, low ceilings, and moderate to extreme precipitation, the aircraft bursts into a veritable "Shangri-La." The wind suddenly dies from extreme violence to 10 knots or less, the precipitation ceases, the low clouds may be visible only on the horizon, blue sky is often visible, and in some cases a dead calm exists. The sea is confused and murky. The discomforts of high temperatures and humidity are forgotten.

If time and fuel permit, a stay in the "eye" of the storm reveals many meteorological aspects reserved for those who fly the storm. The inner wall of the storm towers to altitudes of 25,000 to 35,000 feet or higher. Some storms constantly pulsate and change along the edge of the "eye." The "eye" axis tips from a vertical position in ever changing directions, only to return to the approximate vertical.

Instrumentation

Any discussion concerning cyclone penetration must include a discussion of the instrumentation of the aircraft conducting the penetration. The use of a radio or radar altimeter is an absolute necessity. The rapid pressure drop, common to all tropical cyclones, renders the barometric altimeter useless as a flight instrument. In actual practice the Navy employs a radar altimeter at the aerologist's station. True altitudes are relayed to the pilots at frequent intervals, and these altitudes are cranked into the pressure altimeter until its stops are reached, at which time verbal altitudes are flown. The radar altimeter used in Navy reconnaissance aircraft has proven very reliable, and its accuracy is such that complete reliance can be placed on it.

Other special instruments include a Vortex Thermometer which has proven to be almost totally accurate, a barometer which is accurate to within one m.b., and a radar camera which provides an enduring record of the storm as portrayed on the radar scope.

Only One Way Out

In order to conclude this brief description of a low level penetration, one more item must be mentioned. The only way out is the way you went in!

As in the case of low level reconnaissance, the high level reconnaissance of a tropical cyclone is conducted to provide warning data concerning location, pressures, wind velocities, and direction and speed of movement of the storm. While low level reconnaissance has the advantages of practically constant visual contact with the water, and the elimination of error in instrument calibration which increases the accuracy of the storm reports and navigational fixes, it does increase the hazards present in any flight into a storm. As an example, the loss of an engine at 400 feet, in a 125 knot crosswind and ex-

treme turbulence, on instruments, over a sea which has a layer of wind-driven water suspended above the actual surface, can easily be considered "final"! The high level technique removes some of these hazards. The approach is made at about the 700 m.b. level. Upon entering the storm, all visual flight is generally lost. The penetration is attempted also at about the 700 m.b. level, or higher, as is required by the existing turbulence. When the storm center is reached, a flight altitude is established at 700 m.b., and Dropsondes are released. Central pressures are transmitted by the Dropsondes, and the navigation is checked. Most flights into tropical cyclones at altitudes of 10,000 feet (or 700 m.b.) encounter extreme turbulence, heavy precipitation, and solid instrument flight.

The disadvantages of the high level method accrue from the possibility of large errors in navigation caused by prolonged flight on instruments in unknown wind conditions, and from the increasing difficulty of calibrating instruments as altitude increases.

Circumnavigation Method

The circumnavigation method of tropical cyclone reconnaissance consists of circling the storm at altitudes of between 400 and 700 feet while attempting to remain on an isovelic line in the wind field. The 50 knot to 60 knot circle is generally used, the choice depending on a predetermination of the size of the storm, the intensity of the weather, and the radius of action of the aircraft. The flight is conducted in the direction of the circulation of the storm, and the wind is placed between the starboard quarter of the aircraft and dead astern. This position of the wind relative to the aircraft will, with corrections, allow the aircraft to fly around the storm. This method has a great deal of value when storm conditions are considered too intense to justify penetration. However, its use denies the reconnaissance mission any knowledge of central pressures or intensities other than estimations. It also increases the possibility of navigational error with its attendant error in the actual position of the storm.

Aerial reconnaissance of tropical cyclones employing radar is of very recent origin, and its value is becoming increasingly important. However, due to the classified nature of equipments used, and the limited experience gained to date, it is very difficult to set forth definite techniques. In general, radar appears to give the best results when used on well-developed storms which have well-defined precipitation areas. Storms with weak, localized areas of precipitation present confused pictures on radar scopes, and require very careful analysis to avoid misinterpretation.

How Conclusions Are Reached

This fact is responsible for the extreme coverage given storms in the past few years. The reconnaissance aircraft is required to remain in close contact with the storm to procure repeated presentations in relation to a known land mass or similar definite fix. As the history of the presentations mounts up through the hours, definite conclusions can be attained regarding the storm's rate and direction of movement and its general intensity. Radar observation is particularly valuable during the hours of darkness when other methods of reconnaissance are useless. The use of radar by any aircraft approaching a known or an unknown storm would be very valuable both as a warning and as an indication as to the flight path to choose to avoid the storm.

In conclusion, it is desirable to state again that most statements made in the foregoing are very general in nature, because each storm has its own personality and whims. The joint Hurricane Warning Service has taken notice of the fact, and it seems to this writer that the system of naming each storm with a feminine name is very appropriate.

FLIGHT BAGS

direct from manufacturer

These two combination portfolio and roomy traveling bags fit every pilot's needs. Made of fine top-grain cowhide on a rigid steel frame for extra support. The bag carries all your clothing and personal articles; the portfolio has a separate inside pocket for papers, manuals, charts, etc. Metal studs on bottom prevent scuffing.

FLIGHT BAG 200

Detachable Combination

Bag 18x13x6½, has all-around double zipper; can be opened flat. Padlock included for extra protection. Portfolio 16x11, has heavy mesh all-around zipper. Can be detached or carried in one piece with bag. Available in Suntan or Ginger.

$39 (tax incl.)

FLIGHT BAG 150

One-Unit Combination

Bag 18x8x14, has top zipper and lock; 3 equally divided pockets. Opens wide for easy access.

Portfolio 16x2x12, has heavy mesh top zipper. Saddle stitched throughout. Available in Black, Ginger, Brown or Suntan.

$37 (tax incl.)

Send Check or M.O. to Dept. AL-53

Write for special Flight Bag Catalog

ALLIED BRIEF CASE CO., 186 Fifth Avenue N. Y. C.

REGULATION UNIFORMS FOR ALL AIRLINES

AMERICAN AIRLINES UNIFORMS

ALL WOOL 9 OZ. TROPICAL SUIT	$45.00
ALL WOOL TROUSERS ONLY	13.75
ALL WOOL 14 OZ. SERGE SUIT	50.00
ALL WOOL TROUSERS ONLY	15.50
ALL WOOL 18 OZ. ELASTIQUE SUIT	57.50
ALL WOOL TROUSERS ONLY	17.50
ALL WOOL ELASTIQUE TRENCH COAT LINED	72.50

PAN AMERICAN UNIFORMS

ALL WOOL 9 OZ. TROPICAL SUIT	$38.50
ALL WOOL 14 OZ. SERGE SUIT	42.50
WOOL AND DACRON 8 OZ. TROPICAL SUIT	42.50
WOOL AND DACRON 12 OZ. SERGE SUIT	48.75
ALL WOOL TRENCH COAT LINED	48.75

All Uniforms Made to Measure. Mail Orders Filled.

I. BUSS UNIFORM CO.

MFRS. SINCE 1892

84 FIFTH AVENUE

N. Y. C. **CH. 2-3338**

FIGHT POLIO!

prevention

treatment

Join the MARCH OF DIMES

FIGHT INFANTILE PARALYSIS

The National Foundation for Infantile Paralysis